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ABSTRACT

The Digital Economic Opportunity Committee (DEOC) was created by the National Policy Association (NPA) in 2001 to confront the critical national shortage of workers with the information technology (IT) skills needed for the information age economy. The committee oversaw an 18-month workforce development research project titled Crossing the Digital Divide to Digital Economic Opportunity. The project established that the IT skills gap crisis has impacted virtually all jobs. The following areas were identified as the most critical areas of long-term IT workforce development needed to build a digital workforce: (1) create lifelong learning systems for workers; (2) improve existing IT instruction; (3) increase worker IT training resources; and (4) enlarge the pool of IT workers. Recommended intermediate actions included improving IT instruction by upgrading current teachers' IT skills, increasing the use of IT in classrooms, and reaching out to nontraditional labor pools to recruit and train IT workers. The following items constitute approximately 70% of the document: profiles of successful IT workforce development programs at 25 U.S. firms; a list of 54 web sites of resource organizations; a brief profile of the NPA; lists of NPA officers and trustees and DEOC members; and a list of 14 selected NPA publications. (MN)

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BUILDING A DIGITAL WORKFORCE

Confronting the Crisis

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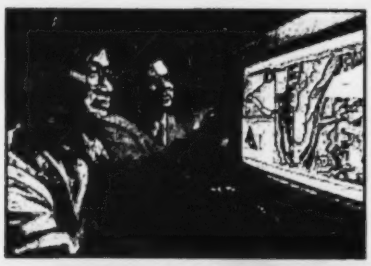

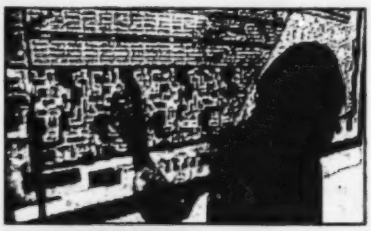

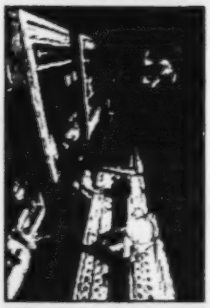

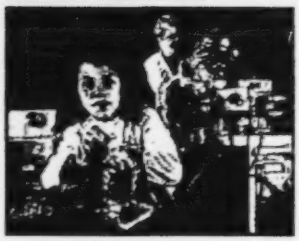

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Introduction and Executive Summary

In the age of information, the nation's prosperity, its democracy, its culture, and its future will depend as never before on the training, skills, ideas, and abilities of its citizens. The people's access to knowledge and learning across a lifetime in the sciences and humanities must become a national imperative in the emerging knowledge-based economy.[1]

Lawrence K. Grossman and Newton N. Minow
A Digital Gift to the Nation

The National Policy Association (NPA) created the Digital Economic Opportunity Committee (DEOC) in early 2001 to confront the critical national shortage of workers with the information technology (IT) skills needed for the information age economy. The DEOC is a committee of 15 business, labor, and education organizations representing more than 10 million workers. The DEOC was charged with developing recommendations for action to be taken by business, labor, education, government, and the nonprofit sectors.

This report sets forth the DEOC's findings and recommendations to close the IT skills gap. These conclusions have evolved through the 18-month workforce development research project, "Crossing the Digital Divide to Digital Economic Opportunity."

[1] Lawrence K. Grossman and Newton N. Minow, *A Digital Gift to the Nation* (New York, NY: The Century Foundation Press, 2001), 3.

The 21st Century Digital Workforce Crisis—A Time for Action

America has a workforce crisis. It has a sufficient supply of workers, but they lack adequate 21st Century IT skills needed to fuel the information age economy. Importing foreign workers to address the IT worker shortage is a stopgap measure, made less desirable by the September 11, 2001, terrorist attacks and the economic slowdown, particularly in the IT sector. The U.S. must look to its own human capital to fill its IT worker needs. It must confront the fact that there is an IT skills gap for the current workforce, which includes older workers as well as teens and 20-year-olds. Unless the country acts now to fill this gap, its competitiveness may be threatened.

Rapidly changing technology has led to the 21st Century IT skills gap crisis.

Not only is this a crisis now, but it also will remain one for the foreseeable future. The U.S. Department of Labor's Bureau of Labor Statistics (BLS) *Employment Outlook, 2000-2010* reports that the seven fastest-growing occupations are computer-related; moreover, through 2010, the demand for computer specialists is projected to grow 68.6 percent and for computer and information systems managers, 47.9 percent. During this time, BLS further projects that computer technology will reduce the demand for typists, tellers, loan interviewers and clerks, secretaries, and other office and administrative support occupations. Without IT training, workers in these increasingly obsolete jobs will be inadequately prepared for new careers and unable to help fill the projected need for new IT workers.[2]

Virtually all jobs in the information age economy are impacted.

This crisis goes beyond the IT sector because virtually all jobs in the information age economy require some level of IT skills. One segment of the workforce needs general IT skills to perform basic computer functions, such as using the Internet, spreadsheets, and word processing. Another segment of the IT workforce performs technical and professional IT work. It designs, produces, and maintains the technology products and requires higher levels of IT skills.

[2] U.S. Department of Labor, Office of the 21st Century Workforce, *XXI Magazine* (Washington, DC). Available from www.dol.gov/21cw/magazine/020314/toc.htm.

Using an analogy, the first group only needs to know how to drive the car, but the second group needs to know how to build and fix it.

Further, in this era of rapidly changing technology, what is learned today may not be useful tomorrow. A report prepared for the American Society for Training and Development (ASTD) and the National Governors Association, asserts that America will face a continuous skills gap and that creating support for lifelong learning is imperative to minimize the shortage.[3]

If current and prospective workers lack the opportunity to gain needed IT skills, then the country as a whole stands to lose its competitive edge. By not addressing this IT skills crisis:

Without action, the country stands to lose its competitive edge.

- Businesses will be less able to hire sufficient numbers of skilled workers at the wage levels needed to be productive and competitive. Although companies can compensate for this IT skills gap in a growing economy through higher productivity, such a solution cannot be sustained in the long run.
- Schools at all levels will be less able to hire enough instructors with the IT skills that are needed to train the workers of today and those of tomorrow.
- Government will be less able to hire enough skilled IT workers to carry out the increasingly IT-dependent functions of providing for the health, welfare, and protection of the country.
- Workers will have fewer opportunities to obtain good jobs, better pay and benefits, and a better quality of life.

Taking action to close the IT skills gap in the current and future workforce is a critical challenge for business, labor, education, government, and the nonprofit sector that requires urgent attention by all stakeholders.

[3] *Into the Future: A Vision Paper*, Wayne Hodgins, Autodesk/Learnativity. Report produced for the American Society for Training and Development (ASTD) and the National Governors Association, Commission on Technology and Adult Learning (February 2000), 13.

The DEOC's Response to This Crisis

The DEOC has identified actions needed to address the workforce crisis.

This report sets out the DEOC's recommendations for increasing the number of U.S. workers with IT skills. The committee believes that implementing these recommendations will ensure the continuation of America's competitiveness, productivity, and workforce employability. The committee is recommending ways to:

- Improve and expand the training of current and prospective IT workers and help them gain experience in applying the technical skills they have acquired through training.
- Enlarge the pool of skilled IT workers by reaching out to underserved populations not traditionally found in the IT workforce and helping them overcome barriers to IT jobs.

The report also includes examples of IT-related workforce development programs, many in a labor-management context, that illustrate how the recommendations can be implemented. These programs are included in a later section of this report, "Workforce Development Programs—What Works."

These findings and recommendations resulted from a series of nine meetings and three conferences held by the DEOC over the life of the project. The DEOC's work has been captured in two previous reports, each emanating from one of the earlier conferences. These reports serve as background to this final report. The first report, *Building a Digital Workforce, Part 1: Raising Technological Skills*, explored the upgrading of IT skills for incumbent workers. It examined two critical aspects of addressing the skills gap: the existing illiteracy and innumeracy among many adult workers and the need for an adequate ongoing training system for workforce development.

The second report, *Building a Digital Workforce, Part 2: Reaching Out to Underserved Communities*, focused on increasing the pool of IT workers by overcoming barriers to recruiting and training members of nontraditional labor pools and underrepresented communities. These include women, minorities, people with disabilities, seniors, Native Americans, and rural and lower income, inner city residents. The report addressed the barriers to obtaining IT jobs, ways to overcome those barriers, and the skills needed.

To ensure a broad-based examination of the issues and the development of realistic recommendations, NPA reached out to a diverse group of business, labor, and educational organizations to join the DEOC. The DEOC includes: ExxonMobil; General Electric Company; Lucent Technologies; 3M; National Alliance of Business; Verizon Communications; American Federation of Teachers; Communications Workers of America; Department for Professional Employees, AFL-CIO; International Federation of Professional and Technical Engineers; National Education Association; United Food and Commercial Workers International Union; Writers Guild of America, East; Graduate School, U.S. Department of Agriculture (USDA); and Montgomery College (Maryland). ASTD and the Federal Reserve Bank of Kansas City's Center for the Study of Rural America also provided technical support and advice.

This project was made possible in part by a grant from the Federal Mediation and Conciliation Service and by DEOC members, who also provided their time and financial support.

Summary of DEOC Findings and Recommendations

The DEOC's recommendations follow. They address the four most critical areas of IT workforce development needed to build a digital workforce that will fuel a more productive and efficient U.S. economy.

Create lifelong IT learning systems for workers.

America lacks adequate lifelong learning systems that meet the IT workforce development needs of today's workers. The overarching recommendation of the DEOC is that government and the private sector, in partnership, create permanent lifelong adult IT training and education systems. These systems need to meet the IT skills training requirements in all sectors of society so that workers have the opportunity to learn and enhance their skills throughout their careers. Such systems also need to address basic literacy and soft skills, such as team

building, problem solving, and leadership, that virtually all workers require.

This is a long-term action program that will require federal and state government commitment comparable to the 1862 legislation to establish land grant colleges through the Morrill Act and 1944 legislation to educate returning soldiers through the GI Bill. The Morrill Act provided a financial basis for today's vast state college system by dedicating revenue from the sale of federally owned land. So too could the revenue that the federal government expects from the sale of spectrum space (broadcast frequencies) be used to support institutions providing adult continuing education and worker training, with emphasis on IT skills.

It is in the public interest to have a national technology education initiative. The existing system of community colleges should become a major delivery vehicle for lifelong IT learning systems.

Improve existing IT instruction.

Clearly, there are significant problems with how, and to what extent, IT is taught. Government and educational institutions should fund and support programs and strategies to upgrade teacher skills in IT at all academic levels so that teachers are adept in using the new technologies. Educational institutions should also work to attract IT teachers and instructors at all academic levels, retain them, and maintain their skills.

Increase worker IT training resources.

Employers and workers must recognize the need in today's world for workers to continually learn and update skills during their careers. Employers should support worker efforts to do so. Employers, public and private, in concert with unions, community groups, and government, should expand resources and opportunities for employee IT training. The federal government should continue the H-1B Training Grant Program to support IT training.

Enlarge the pool of IT workers.

There are potential workers in many sectors of society who lack needed IT skills and who are underrepresented in the IT workforce but could enter the IT field with appropriate training. These include underrepresented populations of older workers, persons with disabilities, minorities, Native Americans, women, non-IT-degreed college graduates with basic IT skills, and persons living in low income inner city and rural communities. Many face barriers to acquiring the skills they need. Businesses, with help from other stakeholders, should tap into these nontraditional labor pools and help candidates overcome the barriers to IT job entry.

Future Role for NPA

The committee concluded its call to action by recommending that NPA, the sponsoring organization for the work of the DEOC, develop an implementation plan, monitor progress, and report on these recommendations. In addition, the DEOC believes that a number of the committee's specific recommendations would be appropriate for NPA to pursue.

Long-Term Actions

FINDING: America lacks adequate lifelong learning systems that meet the IT workforce development needs of today's workers.

The U.S. has an extensive system of schools, colleges, and universities to address educational needs from kindergarten to postdoctoral fellowships. This system worked well in the pre-digital age when traditional schooling was sufficient for a lifetime of work. In today's world, however, methods and information learned yesterday quickly become obsolete because of rapid technological innovation. For IT workers, this results in a continuing skills gap and a need for lifelong learning.

Recognition of this need has prompted the creation of institutions and programs to meet the requirements of adult workers. Witness the growth in community college adult programs and private computer learning centers. Labor and management have also teamed up to develop training centers and programs for their workers. However, what has evolved is a hodgepodge of public and private efforts that are not fully meeting workers' lifelong IT training needs. Program quality varies from community to community because of different educational standards, lack of coordination, and insecure funding.

The DEOC's first report on raising technological skills addressed many of these problems. It found that many adult workers who need to develop or upgrade their IT skills to succeed in the new economy have a fundamental problem: they lack adequate literacy and/or workplace soft skills, such as team building, problem solving, and leadership. Because today's knowledge workers must rely on their brains as well as their hands, workers need a "21st Century literacy" to compete successfully. This literacy is defined as the ability to read, write, and compute with competence; think analytically; adapt to

change; work in teams; and use technology. The magnitude of this literacy problem was highlighted in studies by the Massachusetts Institute for a New Commonwealth (MassINC)[1] and the American Management Association (AMA),[2] which found that about one in three adults lacked basic skills needed for the workplace.

In addition, training investment and funding are episodic and uncertain. Many training efforts are funded as discrete programs with specific funding levels and time frames to address targeted needs. Once the funding is expended and the purposes met, the program ends. Programs are also subject to quickly changing budget priorities.

A case in point is the U.S. Department of Labor's H-1B Training Grant Program, which is funded by the $1,000 fee that an employer pays for each H-1B visa. The visa program applies to foreign workers in special occupations that generally require college degrees, such as IT. The program enables employers to apply for temporary work visas that allow eligible foreign workers to work in the United States for up to six years. The Federal FY 2003 Budget proposes to end the H-1B training program, which has provided more than $185 million for training.

Corporate funding for IT training also is uncertain. Historically, company-sponsored training programs are among the first cutbacks when revenues decline.

RECOMMENDATION: Create lifelong IT learning systems for workers.

The overarching recommendation of the DEOC is that government and the private sector, in partnership, create permanent, lifelong adult IT training and education systems. These systems need to reach all sectors of society so that IT workers can learn and enhance their skills at every stage of their careers. The systems also need to address

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[1] Massachusetts Institute for a New Commonwealth, *New Skills for a New Economy* (Boston, MA: January 2001).

[2] American Management Association, *2001 AMA Survey on Workplace Testing: Basic Skills, Job Skills, Psychological Measurement* (New York: 2001).

basic literacy and soft skills, including team building, problem solving, and leadership, that virtually all workers require. Such systems should:

- Emphasize career growth and development, not just specific job training.
- Involve workers and unions with employers in the assessment, planning, development, and execution of the IT training process.
- Provide on-the-job training and apprenticeship programs in IT.
- Adopt and use industry-recognized IT skill standards in developing training.
- Use a variety of IT training methods, including e-learning, that are suitable for adult learning.
- Leverage the use of private and public computer technology facilities, such as libraries, community technology centers, schools, and colleges, as part of an enhanced delivery system.

To implement such IT training systems, several steps are necessary:

1) Federal and state governments should establish senior workforce development advisors. The advisors would be charged with monitoring all of the government's efforts in IT workforce development training and adult education. They would also make recommendations to improve these training efforts and avoid the fragmentation of efforts that leads to the inefficient use of resources. At the federal level, there should be a Special Assistant to the President for Human Resources Development. At the state level, similar human resources assistants to the governors are needed. The 21st Century workforce crisis is of such importance to the country that the President and governors must have a ready source of current information and advice.

2) Business, labor, education, government, and communities should form partnerships to implement IT workforce development and training by:

- Identifying and involving the necessary stakeholders.

- Establishing positive relationships and communications among stakeholders.
- Developing and sharing community values and visions.

3) The federal government should recognize lifelong learning as a public priority that is an important part of America's global competitiveness. It should provide financial resources to undertake this major technology education effort as it did in 1862 to help found land grant colleges through the Morrill Act and in 1944 to educate returning soldiers through the GI Bill. Among the possible sources of funding for such an effort are the billions of dollars that will be raised from the pending U.S. government sale of broadcast frequencies, or spectrum space. A bill entitled "The Digital Opportunity Investment Trust Act" has been drafted in the U.S. Senate and calls for some of the revenues from these sales to go to this fund, which could be used to support lifelong learning efforts. It provides for a trust that would be patterned on organizations such as the National Science Foundation, the National Institutes of Health, and the Defense Advanced Research Projects Agency to disburse the funds. This lifelong learning initiative requires a sustained financial commitment that is not subject to changing budget priorities. The reductions in programs for community technology centers and training and the proposed elimination of the H-1B Training Grant Program make the need to identify alternative funding sources all the more urgent.

4) The existing system of community colleges should be used as a major foundation for lifelong IT learning systems because:

- They are community-oriented, and many already have extensive adult IT learning programs developed to meet local needs.
- Most community colleges have multidimensional educational delivery capabilities in place, including computer-based training and e-learning.

- There are nearly 1,200 existing community colleges in the country.[3]
- Approximately 85 percent of community colleges are publicly funded.[4]
- Costs to attend community colleges are about half of those to attend four-year institutions.[5]

[3] There were 1,163 public, independent, and tribal community colleges as of October 2001, according to the American Association of Community Colleges (AACC). www.aacc.nche.edu.

[4] Ibid.

[5] U.S. Department of Education, National Center for Education Statistics, Office of Educational Research & Improvement, *NCES Fast Facts: Tuition Costs of Colleges and Universities* (Washington, DC: 2000). Available from www.nces.ed.gov/fastfacts.

Immediate Actions

Creating permanent lifelong learning systems will take time. In the interim, there are actions that can and must be taken immediately to address the IT workforce and training problem, including:

- Improving IT instruction by upgrading current teacher IT skills and increasing the use of IT in the classroom.
- Attracting, training, and retaining IT instructors.
- Increasing resources for worker IT training.
- Reaching out to nontraditional labor pools to recruit and train IT workers.

FINDING: Significant problems exist with IT instruction at all academic levels, especially in K-12.

The future work and IT skill needs of today's students are uncertain. However, the DEOC members believe that there are significant problems with how, or to what extent, IT is now taught. Although the DEOC focused on current workers and did not address the educational needs of future workers, it did identify shortfalls in the IT instructional system today.

Many school systems are addressing these issues. The basic problem, however, is that teachers generally are not IT-fluent, and most do not have time to get the necessary training. Education in IT and the use of it in the classroom must be more than afterthoughts if today's youths are to gain the basic skills they need for the workplace. There is a lack of integration of IT with nontechnology subjects in the standards, curricula, instructional materials, and student testing that guide educational delivery. Teachers need technology resources, such as templates and models, to help them use technology in their teach-

ing. They also need technology support mechanisms, such as IT knowledge networks and mentors.

RECOMMENDATION: Upgrade existing teacher IT skills and promote the use of technology.

To upgrade teacher skills in IT at every academic level and to promote the use of technology in the classroom, governments, school boards, and educational institutions should develop, fund, and support programs and strategies that:

- Integrate technology into the curricula.
- Provide opportunities for teachers to develop their IT skills, including during working hours.
- Formally recognize and reward competency-based demonstrated IT skills and knowledge acquired on the job.
- Increase knowledge networks among teachers and IT professionals.
- Sponsor IT fellowships.
- Provide IT mentors for teachers.
- Encourage development of joint labor-management teacher IT education programs.
- Seek donations of current, relevant computer equipment and software that are not subject to corporate requirements or endorsements.

RECOMMENDATION: Develop systems that attract, train, and retain IT instructors.

To attract IT teachers and instructors at every academic level, retain them, and maintain their skills, educational systems should:

- Offer competitive IT instructor/teacher salaries and other financial incentives to recruit and retain those with demonstrated skills.

- Develop skill standards for IT instructors that are based on IT workforce standards.[1]
- Hire practicing IT professionals as part-time instructors.
- Provide for financial or ownership interests in software and instructional material developed for IT computer-based and distance learning programs.
- Involve IT workers in the schools to train, assist, and mentor IT teachers and instructors.

[1] The International Society for Technology in Education (ISTE) has developed National Educational Technology Standards (NETS) for teachers.

FINDING: Rapid changes in technology require more IT worker training and resources.

Employers and workers must recognize the need in today's world for workers to continually learn and update skills during their careers. In the old economy, workforce training was a priority for most employers. Clearly, in today's economy, this may no longer be true. The degree to which workers spend their entire careers in one company has diminished considerably. The growth of small and mid-sized companies has led to an increasing number of firms that cannot, or do not, train in-house due to limited financial, institutional, and informational capacity. The result is that in times of skilled worker shortages, there is increased competition among companies for a limited number of workers with the necessary skills. With today's high workforce mobility, there is often reluctance on the part of companies to invest in training workers who may well leave for a competitor.

Increasing numbers of workers are self-employed or work for companies on a contract or contingency basis. Here again, firms are reluctant to fund training for contingent workers. Complicating these changing realities is the fact that rapid advances in technology may make what a worker learns today useless tomorrow, so that training dollars spent may have only limited benefits.

In a report released in March 2002, the National Association of Manufacturers called on employers to invest at least 3 percent of payroll for training.[2] According to ASTD's 2002 *State of the Industry Report,* spending on employer-provided training for the typical U.S. company was only 2 percent of payroll in 2000.[3] Although this was a slight increase over the previous year, it is still not enough to meet today's training needs. In an era of diminishing governmental programs to support IT training, employers and workers should support training partnerships and negotiated labor-management training programs that have proven their ability to provide needed IT skills.

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[2] National Association of Manufacturers (NAM), *The Skills Gap 2001* (Washington, DC: March 2002).

[3] American Society for Training and Development, *The State of the Industry Report* (Alexandria, VA: February 2002).

Examples of some of these programs are contained later in this report.

Although government tax credits and other incentives can help businesses provide IT training, there is also a need for direct government training programs, such as the H-1B Training Grant Program. As stated earlier, the proposed federal budget eliminates the H-1B training program at a time when more resources are needed for IT training. According to the AFL-CIO Department for Professional Employees' position paper on the program,[4] 60 training programs have been funded since February 2000. If the program is ended, as much as a half billion dollars earmarked for both current and future training over the next several years would be diverted from training to the alien labor certification program.

These issues point to the need for new approaches to workforce development and worker training. The responsibility for workforce development in the new economy now rests upon a large group of stakeholders. The players include not only the business and labor communities but also government, educational, and nonprofit institutions.

RECOMMENDATION: Expand IT training resources for workers.

1) To expand resources for employee IT training, employers, public and private, in concert with unions, community groups, and government should:

- Offer scholarships, low interest loans, and tuition grants for IT education.
- Grant time off for employees who are participating in IT training.
- Provide employees access to computers (during and after work hours) to enable them to participate in distance learning and other computer-based training.

[4] "Bush Budget Proposes Elimination of High Tech Training Program," Department for Professional Employees, AFL-CIO, Fact Sheet, 2002.

- Participate in joint labor-management IT training programs.
- Develop IT training partnerships and consortia.

2) The federal government should continue the U.S. Department of Labor's H-1B Training Grant Program.

FINDING: Many workers lacking needed IT skills come from populations that are not traditionally found in the IT workforce, and they face barriers to IT job entry.

Certain population groups traditionally have been underrepresented in the IT workforce and less connected with information technology. These include: women, minorities (especially African Americans and Latinos), people with disabilities, seniors, and Native Americans as well as residents of low income rural and inner city communities. The DEOC's second report examined in detail these populations and the barriers they face and suggested ways to increase their participation in the IT workforce.

The DEOC identified a series of cultural/social, technological, educational, opportunity, and structural barriers that have hindered and discouraged participation in the IT workforce. These include:

- Stereotypical images about certain populations.
- Social and physical isolation.
- Lack of computer access and irrelevant Internet content.
- Inappropriate teaching methods and mediocre education.
- Insufficient information about IT jobs and training opportunities.
- Lack of English language skills.
- Disabilities.

Stereotypes, unfamiliarity with workplace norms, and isolation have contributed to these groups' underrepresentation in the IT world. Ironically, one of these groups—seniors—is a potential safety valve for the IT workforce crisis because many older workers want to continue working beyond normal retirement age. To take advantage of this resource, companies will need to change their attitudes toward older workers and be willing to make accommodations.

The absence of user-friendly hardware and software also impedes development of IT and related skills. Although access to computers and the Internet is becoming less of an issue, it still remains one for

certain populations such as African Americans, Latinos, Native Americans, and people with disabilities. The lack of racially or culturally relevant Internet content may also be a problem.

Education is another key factor. The teaching methods used in technology and computer training can be a barrier, as can the educational content. Inappropriate approaches to teaching or inadequate educational preparation hinder the learning needed to pursue IT careers.

The lack of information about IT fields and opportunities can prevent or limit entry and job growth in IT. Many workers from underrepresented segments of the population do not pursue the IT field because they simply do not know enough about it to do so. Others face unequal access to ongoing training opportunities. Discriminatory practices, such as in minority hiring, also limit opportunities.

There are many potential solutions for increasing the level of underserved and underrepresented populations in the IT workforce. Because no single solution can overcome the barriers, a comprehensive approach is needed that would:

- Increase awareness of workers' abilities and needs.
- Expand training and educational opportunities.
- Provide motivation, support, and assistance.
- Foster enlightened community leadership and partnerships.
- Engage employers and unions.
- Involve government.

RECOMMENDATION: Reach out to and train populations not traditionally found in the IT workforce.

Businesses, with help from other stakeholders, should seek to expand the IT workforce with members of nontraditional labor pools (older workers, persons with disabilities, minorities, women, non-IT-degreed college graduates with basic IT skills) and underrepresented groups, especially in low income inner city and rural communities.

Because these populations face different types of barriers, a one-size-fits-all response will not work. Stakeholders need to:

- Develop and participate in recruiting programs that target these groups.
- Focus training programs on these groups and recognize their particular training needs/problems.
- Offer on-the-job opportunities for exposure to IT work as well as IT-focused work projects.
- Initiate programs and participate in efforts that increase public awareness of and knowledge about members of these groups to address stereotypes.
- Motivate and support potential workers from these groups to enter the IT field, including knowledge-industry entrepreneurial opportunities.
- Make reasonable accommodations for barriers such as language and disability.
- Form local and regional partnerships to provide opportunities for training and development.

Conclusion and Call to Action

America is facing a dramatic 21st Century workforce crisis that the country must address to avoid losing its competitive edge. The crisis, driven by rapid advances and changes in workplace technology, is manifested in the gap between the level of IT skills that current workers possess and the level needed for information age jobs. There are sufficient numbers of existing and potential workers to fill those jobs, but they lack opportunities to obtain the right skills. The solution for closing this gap appears to be simple: train them. How best to do this has been the focus of the DEOC's research and discussions. While the concept may be simple, implementing it is not.

Create lifelong learning systems.

The long-term solution is to create lifelong learning systems.

At the base of any lifelong IT learning system is the need for competency-based skill standards. IT skill standards provide businesses, workers, students, educators, and government with a means to communicate performance expectations, align education programs with workplace needs, and link industry expectations and students. Using recognized IT skill standards to develop IT training programs and curricula, such as those developed by the National Workforce Center for Emerging Technologies (NWCET)[1] and the International Society for Technology in Education (ISTE),[2] would also provide uniformity and acceptance. For example, in the network administrator certification programs of Cisco Systems and Microsoft, passing courses and earning the resulting certificates provide students with

[1] Further information on the National Workforce Center for Emerging Technologies can be found at www.nwcet.org.

[2] Further information on the International Society for Technology in Education can be found at www.iste.org.

marketable skills nationwide. Employers know what to expect when they hire a worker with a certification and workers know what is expected of them.

Although companies such as Cisco and Microsoft have established training programs to address particular skill needs, there are many other essential literacy skills, soft skills, and IT skills for which adequate programs do not exist. It is in the public interest to have a national technology educational initiative. The country should turn to the existing system of community colleges as a vehicle to fill this gap.

Regardless of the delivery mechanism for lifelong learning systems, two key factors remain. First, there must be an ongoing source of funds to establish and sustain lifelong learning and to help workers obtain the needed training. The committee has cited federal proceeds from the sale of broadcast frequencies as a possible source for this funding. Second, these training efforts should be accomplished through partnerships of business, labor, education, government, and the nonprofit sector because all have a vested interest in filling the skills gap that has produced this 21st Century workforce crisis.

Improve IT instruction, increase training resources, and enlarge the pool of workers.

Because creating permanent lifelong learning systems will take time, there are immediate actions that can be taken in three areas to close the IT skills gap:

1) Improve existing IT instruction by upgrading teacher IT skills; increasing the use of IT in the classroom; and attracting, training and retaining IT instructors. Programs and strategies must be implemented to provide existing teachers and instructors with opportunities to gain IT skills. These elements include: offering training during working hours, developing IT knowledge networks, sponsoring IT fellowships, and providing mentors. Efforts must also be taken to attract, train, and retain additional IT instructors through competitive salaries and financial incentives, use of skill standards, and the hiring of IT professionals on a part-time basis.

Need to upgrade existing teacher IT skills and attract more IT instructors.

Need to increase IT training resources.

2) Increase resources for IT training. Employers, public and private, in concert with labor unions, community groups, and government, should expand resources and opportunities for employee IT training. Examples include offering financial assistance to workers, granting paid release time, and providing workers with computers for training. The federal government should continue the H-1B Training Grant Program to support IT training.

Need to reach out to, recruit, and train underrepresented populations for IT jobs.

3) Reach out to nontraditional labor pools to recruit and train IT workers. There are potential employees in many sectors of society who lack needed IT skills and are underrepresented in the IT workforce but could enter the IT field with appropriate training. These include: older workers, persons with disabilities, minorities, Native Americans, women, non-IT-degreed college graduates with basic IT skills, and underrepresented groups, especially in low income inner city and rural communities. Many face barriers to acquiring the skills they need. Businesses, with help from other stakeholders, should tap into these nontraditional labor pools and help them overcome the barriers to IT job entry. Among specific actions: develop targeted recruiting programs, tailor training programs to a group's needs, offer opportunities for IT job exposure, initiate programs to motivate and support entry into the IT field, and provide accommodations.

Carrying out the recommendations.

DEOC members have also observed that the results of policy research too often land on shelves and gather dust. To avoid this outcome, some organization must be given responsibility to develop an implementation plan, monitor and report on progress, and recommend further or amended actions as needed.

NPA should take the lead role in carrying out these recommendations.

NPA, the sponsoring organization for the work of the DEOC, in partnership with other appropriate organizations, should take the lead. NPA has a long history of bringing together influential business, labor, and academic leaders to seek effective and innovative strategies to address critical economic and social problems in the United States. Thus, NPA is well suited to fill this role. Resources should be identified to continue the work of the DEOC, through foundations, government grants, and/or membership support.

Among the committee's recommendations are a number of specific actions that would be appropriate for NPA to pursue, including the development of:

- Joint labor/management IT training programs.
- Skill standards for IT instructors.
- IT worker training partnerships.
- IT worker recruiting programs targeted at underrepresented populations.

The DEOC's Call to Action

Realistically, there is a limit, set deep in our education and training systems, to the speed with which new skills can be acquired and old ones abandoned, as well as a limit to the pace at which new technologies can be absorbed and applied efficiently. This speed can be increased with systems that reeducate, retrain, and do all that is possible to avoid the obsolescence and underutilization of human resources. However, to put such systems in place and administer them properly, labor, business, education, and government must work together. Education and training at all levels and at all stages of life must become a priority for all of society. This is the DEOC's solution to the 21st Century workforce crisis.

Labor, business, education, and government must work together.

Workforce Development Programs—What Works

The DEOC has identified a number of workforce development programs and initiatives that embrace many of the recommended actions. The efforts described in this section provide examples of what works and what could be done on a larger scale to meet the IT training needs of the country's workforce. There are several common characteristics noted among these programs, which could form the basis for the IT lifelong learning systems recommended by the DEOC.

- Many are long-time programs that are free from the vagaries of short-term government and corporate budgets and policy changes. Many are funded through the collective bargaining process.
- A variety of training methods and sources are used, including learning labs, classroom training, e-learning, colleges, and universities.
- Resources are provided to support individual worker training. Some provide the use of computers, while others provide prepaid tuition, scholarships, work release time, and on-site learning facilities.
- Training needs are determined through local assessment of worker and company skill needs. Many programs provide counseling and career development services.
- Virtually every program includes some form of partnership among labor, business, education, and government for developing and carrying out the training.

The workforce development programs described in this section are

organized to correspond to the DEOC's recommendations, as follows:

Labor/management IT training programs for workers:

- The Alliance for Employee Growth and Development, Inc.
- CWA/NETT and Workforce Transition Project (WTP)
- Enhanced Training Opportunities Program (ETOP)
- Institute for Career Development (ICD)
- Northeast H-1B Skills Training Project
- Pathways Training Partnership
- Quality Through Training Program (QTTP)
- UFCW Local 832 Training Centre
- Verizon Next Step Program

Increasing and improving IT teacher/instructor training:

- MarcoPolo Website
- Partnership for Technology Integration
- Pathways to Teaching Careers Program
- Teaching+Technology Initiative/Teaching+Technology Support Partners
- Teach to the Future
- Tech Camp for Faculty
- Vocational Instructor Recruitment Initiative (VIRI)

Enlarging the pool of IT workers:

- Got/IT! - Rural Revitalization through Technology
- Latinas en Ciencia
- The Next Step©98
- One Economy Corporation
- Origin, Inc.
- PASS*IT*ON

- SBC Pacific Bell School Volunteer Program
- Senior Community Service Employment Program (SCSEP)
- Technology Enhancement Capital Campaign (TECC)

The Alliance for Employee Growth and Development, Inc.

Location/service area: Nationwide

Sponsors/partners: AT&T, Avaya, Communications Workers of America (CWA), Lucent Technologies

Funding sources: Collective bargaining process

Program description:

The Alliance is a joint labor/management venture that provides training and educational opportunities to thousands of union-represented employees at AT&T, Avaya, and Lucent. The Alliance program's goal is to enable the workforce to keep pace, become lifelong learners, and remain employable in an age when the market demands knowledge workers. Alliance local committees, made up of union and business leaders, help determine local training opportunities that are relevant, convenient, and on-target with skill-building needs. The Alliance offers more than 250 course titles per year through a national training network that includes more than 200 partners, including community colleges and universities.

Achievements:

In 2000, the Alliance served more than 33,000 individuals (48 percent of eligible participants). On average, individuals received 40 hours of training at a cost of $22 per hour. Fifteen percent participated in distance learning and independent study. More than 50 percent took some training during work hours. Since its inception in 1986, the Alliance has served more than 150,000 participants and provided 9.5 million training hours.

Significant attributes:

- Uses local labor/management committees to determine training needs.
- Funded through the collective bargaining process.
- Integrates individual learning options into the training menus.
- Provides training during working hours.

Further information:

- Website: www.employeegrowth.com
- Alliance Headquarters
  Corporate Park III
  580 Howard Ave.
  Somerset, NJ 08873

CWA/NETT and Workforce Transition Project (WTP)

Location/service area: Nationwide

Sponsors/partners: Cisco Systems, CWA, U.S. Department of Labor, Stanly Community College, and National Advisory Coalition on Telecommunications

Funding sources: U.S. Department of Labor (H-1B grants), Cisco Systems (equipment and curriculum), Stanly Community College (mentors and accreditation), CWA (mini-lab space and proctors)

Program description:

CWA/NETT-WTP provides state-of-the-art training in computer and networking technologies to CWA members and transitioning military personnel. Cisco provides training and certification through the Cisco Networking Academy Program. CWA recruits participants and offers job placement assistance. The Department of Labor offers appropriate training and job placement for military personnel. Stanly Community College provides the infrastructure, educators, and accreditation. The program provides quality skill assessment and evaluation leading to a personalized training program and certification. Most programs are offered on-line with scheduled time in CWA-proctored mini-labs at CWA offices around the country. Instructors are available to students through e-mail and telephone. Workers may enroll in the program at any time. There are CWA mini-labs in eleven locations.

Achievements:

CWA/NETT-WTP was launched in March 2000 with about 75 on-line students. As of September 2000, there had been nearly 400 enrollments. It uniquely combines distance learning, a personalized program, one-on-one mentoring, local labs, accreditation, and certification. It has been able to offer courses at substantially lower tuition costs than other providers.

Significant attributes:

- Reflects a successful partnership among business, labor, government, and education.
- Uses distance learning as the primary training delivery mechanism.
- Through up-front assessment, tailors the training to meet individual needs and abilities.
- Based upon nationally recognized skill standards and certification.

Further information:

Website: www.cwanett.org/military.asp

Enhanced Training Opportunities Program (ETOP)

Location/service area: Shreveport, LA; Reading, PA; Allentown, PA; Breinigsville, PA; Columbus, OH; Denver, CO; Little Rock, AR; Oklahoma City, OK; Omaha, NE; Orlando, FL

Sponsors/partners: International Brotherhood of Electrical Workers (IBEW), Lucent Technologies, Avaya Inc., Agere Systems, Inc.

Funding sources: Primarily collective bargaining process, tuition revenues

Program description:

ETOP is a joint labor/management program committed to lifelong learning. The program provides education and training opportunities to develop employee occupational and communication skills, increase employee knowledge of relevant and emerging technologies, and create new opportunities for personal and professional development. Each location has a local joint committee consisting of equal union and management participation. The committee assesses local worker training needs, initiates applications for ETOP funding, and oversees the effectiveness of the training. ETOP has established learning centers at its participating employer organizations' manufacturing facilities. These centers, which are equipped with computers, multimedia stations, classrooms, and resource libraries, provide services such as educational advising, career counseling, computer skills training, on-site credit courses, and workplace skills instruction.

Achievements:

ETOP was first negotiated in 1986. In 2000, 49 percent of eligible participants used ETOP programs and services. More than 14,000 individual courses were funded, and ETOP enrolled 3,187 employees in a selection of more than 250 ETOP computer courses. More than 20,000 employee contacts were made with ETOP counselors, and more than 5,500 employees received instruction from the workplace-skills instructors.

Significant attributes:

- Local labor/management committees determine and monitor training needs.
- Funded through collective bargaining process.
- Uses on-site learning centers to facilitate access.
- Provides a full range of assessment, counseling, and career development services.

Further information:

- Website: www.etop.org
- ETOP, Inc.
  1013 Hawthorn Drive
  Itasca, IL 60143

Institute for Career Development (ICD)

Location/service area: Member steel companies

Sponsors/partners: United Steelworkers of America (USWA) and 13 steel companies (AK Steel Corp; Allegheny Corp; Bethlehem Steel Corp; Ispat Inland, Inc; J&L Specialty Steel, Inc; Lorain Tubular Co; LTV Steel Co; National Steel Corp; Republic Technologies International; USS-POSCO; U.S. Steel; WCI Steel, Inc; Wheeling-Pittsburgh Steel Corp)

Funding sources: Collective bargaining process

Program description:

The original contract language expresses the philosophy of ICD: "Experience has shown that worker growth and development are stunted when programs are mandated from above, but flourish in an atmosphere of voluntary participation in self-designed and self-directed training and education." Following that philosophy, ICD offers programs in basic skills enhancement (General Equivalency Diploma [GED] prep; reading, writing, math refresher; English as a Second Language [ESL]; problem solving; communication skills, etc.); technical skills enhancement (shop math; technical writing; computers, etc.); and personal development (life skills; college-level and degree courses; personal interests, etc.). Eligible USWA employees can apply for prepaid tuition assistance (up to $1,800 per calendar year).

Achievements:

Began efforts to upgrade and expand essential skills in 1989. In its latest reporting cycle, ICD reported offering more than 1,700 classes in 25 different subjects to more than 12,000 participants.

Significant attributes:

- Funded through the collective bargaining process.
- Assists employees with prepaid tuition assistance.
- Provides workers with portable skills.
- Addresses need for basic and soft skills.

Further information:

Website: www.icd-uswasteelco.org

Northeast H-1B Skills Training Project

Location/service area: Boston, MA, metro area

Sponsors/partners: CWA Local 1365, CWA-IUE Local 201, Massachusetts AFL-CIO, Lucent Technologies, Ametek Aerospace, University of Massachusetts-Lowell Labor Extension Program, Metro North Workforce Investment Board, Lower Merrimack Workforce Investment Board

Funding sources: U.S. Department of Labor H-1B grant, employer match that includes the value of work-release time. Lucent provided an additional technical training room.

Program description:

The program enables semiskilled incumbent workers at Lucent and Ametek to obtain higher-level skills and move into vacant higher-skilled technology positions. Both companies were having difficulty filling vacancies in these higher-skilled positions and were outsourcing lower-end jobs. To address the skills shortage, a three-level "H-1B Skills Ladder" has been developed for union members, with three levels of training: Tier 1-Preparatory Skills Program (math, reading, writing, study skills), Tier 2-Tester/Technician Training Program, and Tier 3-Technician Preparatory Program or Computer/Electronics Associate Degree. Labor/management committees at each workplace coordinate implementation. Two community colleges have been asked to be training providers. Training will be provided on-site with partially paid release time. The program also serves laid-off workers.

Achievements:

The program's goal is to train up to 750 workers at Lucent and Ametek over a two-year period that began in 2001. To date, nearly 500 individuals have participated in the program.

Significant attributes:

- The training is transferable.
- Program formed from a partnership of labor, business, education, and government.
- Training curriculum derived from assessment of local business and worker skill needs.
- Paid release time and on-site training provided.
- Upgrades skills of existing company workers to meet skill shortages.

Further information:

Judy Coughlin, Director
978-934-3239
judith_coughlin@uml.edu

Pathways Training Partnership

Location/service area: Qwest workplace sites

Sponsors/partners: Qwest Communications and CWA

Funding sources: Collective bargaining process

Program description:

Pathways is a voluntary education-benefit program for CWA-represented employees. It enables employees to take courses in subjects of their choosing on their own time. It includes prepaid tuition and fees; education and career planning assistance; and assessment of skills, interests, aptitudes, and prior learning. Eligible employees are entitled to up to $2,100 per calendar year for continuing education or unlimited tuition for undergraduate degrees and specific essential-skills courses. Reimbursement for textbooks is also provided upon course completion. Employees are permitted to use company computers on their own time to do class work.

Achievements:

The Pathways program has been in existence since 1987 and has been rebargained and enhanced every three years. In 2001, approximately 4,400 out of 33,000 eligible workers participated in the program, and 124 received a certificate, license, or degree.

Significant attributes:

- Focuses on career development needs above and beyond required job training.
- Provides prepaid tuition and fees assistance.
- Permits use of company computers to perform class work.

Further information:

Website: www.pathways-tpi.org

Quality Through Training Program (QTTP)

Location/service area: Seven work sites in Washington, Oregon, and Kansas

Sponsors/partners: International Association of Machinists (IAM) and the Boeing Company

Funding sources: Collective bargaining process

Program description:

QTTP offers a diverse range of lifelong learning programs for training, e-training, and personal growth in four major areas: career and personal development, technology change, job combinations, and layoff. Career advisors provide skills assessment and educational and career guidance at each of the seven QTTP sites. Learning labs at each site provide courses in computer skills and individual development. QTTP in-plant skill centers are located in five of the work sites. The skill centers–guided by local steering committees made up of employees, management, and the union–help identify local training needs and ensure that services are customized to site needs. QTTP provides basic skills training using individualized instruction, computer-based training, individual tutoring, and instructor-led classes.

Achievements:

IAM and Boeing first recognized the potential impact of new technology on the company and employees in 1983 and negotiated QTTP in 1989. Since then, the program has helped thousands of IAM-represented employees.

Significant attributes:

- Funded through the collective bargaining process.
- Courses available on-site through a variety of training methods.
- Focuses on both job skills and career development.
- Skill centers are directed through local labor/management partnerships.

Further information:

Website: www.iam-boeing.com

UFCW Local 832 Training Centre

Location/service area: Manitoba, Canada

Sponsors/partners: United Food and Commercial Workers International Union (UFCW) Local 832, 55 companies, Manitoba departments of Education and Training and Labour, Winnipeg Technical College, College Universitaire de Saint-Boniface, rural community colleges

Funding sources: Employer contributions to the Training Trust Fund (the level of the contribution per hour worked is determined through the collective bargaining process) and government funds

Program description:

The UFCW Training Centre is located in Winnipeg; it also provides services through a satellite training facility in Brandon and at local colleges for small rural communities. The Centre also provides language and literacy courses at the workplace. Courses are provided in computer literacy, adult high school, foundation literacy (e.g., French; English; and reading, writing, and math refreshers), personal health and well being, career transition, specific job skills, and workplace safety and health. Six full-time staff and 30 part-time contract instructors provide instruction. Although most programs are offered on evenings and Saturdays, there are some daytime programs for shift workers and some employer-specific programs. Over $30,000 a year in scholarships is awarded to employees of companies that contribute to the Training Trust Fund.

Achievements:

The Training Trust Fund was created in 1986 with two companies; that number has now grown to 55. The Centre serves more than 16,000 UFCW members in Manitoba. Since its inception, the Centre has awarded $500,000 in scholarships.

Significant attributes:

- Union-run training program.
- Funded through Training Trust Fund that is funded through collective bargaining.
- Operates through a partnership of labor, business, government, and education.
- Provides scholarships to eligible UFCW members whose companies contribute to the Training Trust Fund.

Further information:

Website: www.ufcw832.mb.ca/Training.htm

Verizon Next Step Program

Location/service area: New York and New England

Sponsors/partners: Consortium of 26 Northeastern community and technical colleges, Verizon Communications, CWA, IBEW

Funding sources: Verizon

Program description:

The Next Step Program offers Verizon technicians in New York and New England an opportunity to earn an Associate Degree in Applied Science (A.A.S.) with a special focus on telecommunications technology. The program was developed by a consortium of colleges, in cooperation with Verizon managers and the unions. Employees attend class one day a week on company time at a participating community or technical college. This four-year program includes courses in general education, electronics, and telecommunications. Verizon has identified umbrella soft skill competencies that have been embedded in the core courses. These skills include: quality, customer focus, team building, project leadership, problem solving, technology, and service delivery. Each Next Step student is provided a laptop computer to use during the program. Participants are required to pass an entrance examination that measures basic skills in reading, writing, numerical reasoning, and elementary algebra.

Achievements:

Next Step began in New York in 1995 and in New England in 1996. Since its inception, the program has served more than 3,900 workers. As of February 2002, there were 1,630 employees active in the program and 1,152 graduates. Overall, the program has had a 71 percent retention rate.

Significant attributes:

- Uses consortium of community and technical colleges for training delivery.
- Provides laptop computers and time off to take courses.
- Integrates soft skill competencies into curriculum.
- Company pays the cost of the program.

Further information:

Website: www.aboutnextstep.com

MarcoPolo Website

Location/service area: Nationwide

Sponsors/partners: WorldCom Communications, National Geographic Society, National Endowment for the Humanities, JFK Center for the Performing Arts, National Council on Economic Education, American Association for the Advancement of Science, National Council of Teachers of Mathematics, and Council of the Great City Schools

Funding sources: WorldCom Foundation (staffing and funding)

Program description:

MarcoPolo is a gatekeeper web site and teacher training program that shows K-12 teachers how to use Internet resources in daily teaching. The service is provided at no cost to teachers and schools. WorldCom handles the technical aspects of the program while the educational-organization partners write original lesson plans, review links, and explain the national standards. Representatives from WorldCom or the partners go out to train instructors who, in turn, train local teachers on use of the MarcoPolo site and the Internet in their teaching.

Achievements:

MarcoPolo averages about 300,000 users a month.

Significant attributes:

- A business-educational partnership assists public school teachers with technology.
- Uses the Internet to integrate technology with curriculum.
- Provides services at no cost to teachers and schools.
- Uses train-the-trainers approach to disseminate training.

Further information:

Website: http://marcopolo.worldcom.com

Partnership for Technology Integration

Location/service area: El Paso, TX

Sponsors/partners: University of Texas at El Paso (UTEP), 100 schools in 12 school districts, and Region 19 Education Service Center

Funding sources: U.S. Department of Education (Technology Innovation Challenge Grant)

Program description:

The project's purpose is to integrate technology with challenging instructional content to accelerate student achievement. The project does this by providing: job-embedded teacher transformation activities to integrate technology across the curriculum; opportunities for teachers to earn masters degrees in technology integration at UTEP; leadership and advocacy training for school administrators; and training for parent educators to develop Parent Centers in the schools. The centerpiece of the UTEP masters program is a mentoring class designed to enhance the technology and leadership skills of the teachers. Graduates of the program are expected to mentor at least three other teachers at their schools. The mentoring course helps teachers develop effective interpersonal communication skills, through both theory and practice, to go beyond just teaching others technology.

Achievements:

By the end of the five-year grant in 2003, the program expects to have trained 500 technology-teacher leaders, 100 school administrators and technology coordinators, and 200 parent educators. It also expects to produce 200 master teachers with masters' degrees. Through the mentoring program, an estimated 1,000 teachers will ultimately benefit from the 350 teachers who have enrolled in the UTEP program.

Significant attributes:

- Provides IT skills development for teachers.
- Targets all constituencies in the local school (i.e., teachers, administrators, parents).
- Relies on teacher mentoring as a key feature of the training strategy.
- Implemented through a partnership of local public schools, a regional education service center, and a university.

Further information:

Website: http://challenge.utep.edu

Pathways to Teaching Careers Program

Location/service area: New Orleans, LA

Sponsors/partners: Xavier University, New Orleans Public School District

Funding sources: DeWitt Wallace–Reader's Digest Fund

Program description:

The purpose of the program is to recruit and develop a diverse and qualified teaching force to work in low income rural and urban public schools. In Xavier University's "Certification for New Orleans School Teachers: New Options" initiative, Pathway fellows are recruited from a pool of provisionally licensed or substitute teachers as well as teachers certified in other disciplines. The program targets mathematics and science instructors who teach African American students. The teachers gain an opportunity to increase their knowledge in English, mathematics, computer science, biology, chemistry, and physics. Through the program, teachers improve their teaching skills, learn to integrate technology into teaching, and meet Louisiana certification requirements. Each teacher admitted to the program is assigned an advisor/mentor. This is a tuition-waiver program, so the participants must pay only for books and fees.

Achievements:

Over the three years of this phase of the program, 15 teachers on average are recruited annually to participate. Approximately 97 percent of participants complete the program, and most continue to teach in urban schools well after graduation.

Significant attributes:

- Recruits teachers to become certified in English, mathematics, and sciences to teach in urban schools.
- Uses fellowships with tuition waiver for participants.
- Emphasizes integration of technology into teaching.
- Operates through a partnership of a local public school system and university.

Further information:

- Website: http://xuweb.xula.edu/EduPathways.htm
- Janice H. James
  Project Director, Division of Education
  Xavier University, Campus Box 59A
  7325 Palmetto Street
  New Orleans, LA 70125
  504-485-5258
  jjames@xula.edu

Teaching+Technology Initiative/Teaching+Technology Support Partners

Location/service area: University of Virginia, Charlottesville

Sponsors/partners: University of Virginia

Funding sources: University of Virginia

Program description:

The Teaching+Technology Initiative (TTI) is a faculty-development program to help instructors incorporate technology into their courses. TTI provides faculty with hardware and software, technical assistance, and release time to complete projects to enhance undergraduate teaching. The program uses fellowships that release faculty from teaching responsibilities for one course or provide one month's summer salary. TTI is augmented with the Teaching+Technology Support Partners (TTSP) program. Under TTSP, graduate-student fellows ("partners") are trained to provide technology support to faculty in the development of instructional applications.

Achievements:

Since TTI was begun in 1995 and TTSP in 1998, more than 250 faculty members have been assisted. The program has also generated new interest in teaching with technology among non-participating faculty. The program costs approximately $250,000-300,000 per year.

Significant attributes:

- Trains instructors to integrate technology into their instruction.
- Uses fellowships.
- Provides release time for training.
- Offers teacher support through graduate-student TTSP mentors.

Further information:

- Website: http://cti.itc.virginia.edu/tti/index.html
- John Alexander
  Manager, Instructional Technology
  University of Virginia
  434-243-6619
  jaa9n@virginia.edu

Teach to the Future

Location/service area: Nationwide and 24 other countries

Sponsors/partners: Intel Corporation, Microsoft Corporation

Funding sources: Intel will invest $100 million in cash, equipment, curriculum development, and program management. Microsoft has donated software. Additional support is provided by the Bill and Melinda Gates Foundation; Premio Computers; SMART Technologies; Texas Telecommunications Infrastructure Fund; Amax Information Technologies; BOLData Systems; Caliber Computer; Dell Computer; Gateway Computer; OmniTech, Inc.; SMARTerKids Foundation; Tangent Computer.

Program description:

The Intel Teach to the Future program is a worldwide effort to help teachers integrate technology into the classroom. The goal is to prepare today's teachers and students for tomorrow's demands. Using Internet, web page design, and productivity software, the program is available to K-12 in-service teachers as well as pre-service educators. Teachers learn from other teachers how, when, and where to incorporate technology tools and resources into their lesson plans. They also learn how to create assessment tools and align lessons with district, state, and national standards.

Achievements:

By the end of 2002, Intel Teach to the Future will have provided training to more than 500,000 teachers worldwide.

Significant attributes:

- Fosters the integration of technology into the classroom.
- Receives funds, equipment, and software from technology companies.
- Relies on teacher-to-teacher mentoring and support.
- Uses Internet-based training delivery.

Further information:

Website: www.intel.com/education/teach/facts.htm

Tech Camp for Faculty

Location/service area: University of Minnesota, Duluth

Sponsors/partners: University of Minnesota, Duluth

Funding sources: University of Minnesota, Duluth

Program description:

Tech Camp is a total-immersion program that provides laptop computers to faculty and training to use the computers in the classroom. The seven-day program teaches technology skills to faculty and provides them with release time and assistance to develop a course-related project. Participants receive funds to purchase a laptop computer ($2,500) and software ($500) as an incentive. Faculty members also receive 20 hours of support from student consultants after they complete Tech Camp. After finishing the program, participating faculty are required to share experiences and projects with other faculty.

Achievements:

Six camps have been held since March 1999. Each Tech Camp can accommodate 20 participants.

Significant attributes:

- Uses short-term total-immersion strategy to train instructors in the classroom use of computers.
- Grants release time to participants.
- As an incentive, provides funds for participants to purchase laptop computers and software.
- Provides post-training technical support.

Further information:

- Website: www.d.umn.edu/itss/etrg/techcamp/
- Linda L. Deneen
  Director, Information Technology
  University of Minnesota – Duluth
  218-726-7588
  ldeneen@d.umn.edu

Vocational Instructor Recruitment Initiative (VIRI)

Location/service area: Los Angeles, CA

Sponsors/partners: Los Angeles Community College District (LACCD)

Funding sources: Appropriated funds

Program description:

The program recruits vocational instructors in nursing, computer information systems, engineering, multimedia, culinary arts, automotive technology, and construction technology. To do so, the program: documents instructor shortages, works with professional organizations to identify and contact potential candidates, develops and distributes recruitment materials, helps potential instructors raise skill levels to meet minimum requirements, fosters mentoring relationships between current and potential instructors, presents teaching as a professional career opportunity to students, and disseminates successful recruitment strategies to other vocational institutions.

Achievements:

The project began in March 2002 and will continue through July 2003.

Significant attributes:

- Employs multiple instructor recruitment and development strategies.
- Reaches out to local professional organizations for assistance.
- Uses mentoring and support mechanisms to help prospective instructors.

Further information:

- Website: http://marlin.laccd.edu/WorkforceDevelopment/WD_Office_Webpage/IRVING.htm
- Dr. Richard Pfefferman
  Dean of Workforce Development
  District Workforce Development Office
  Los Angeles Community College District
  213-891-2029
  pfeffer@laccd.cc.ca.us

Got/IT! – Rural Revitalization Through Technology

Location/service area: Iowa, Minnesota, Montana, Nebraska, North Dakota

Sponsors/partners: Experience Works, Inc. (formerly Green Thumb, Inc.) and Microsoft Corporation

Funding sources: U.S. Department of Labor

Program description:

Got /IT! is an IT training initiative that trains older workers to acquire the IT skills needed by today's technology businesses. The program was expanded into five rural states as the one-year Rural Revitalization through Technology (RRT) program. RRT recruits rural residents, particularly low income older people, welfare recipients, dislocated workers, displaced homemakers, and other under- and unemployed people, who want jobs requiring technology skills. At the same time, RRT identifies rural employers in need of IT-skilled workers and provides training grants to them for use in training prospective employees. Employers must commit to hire the trainees after successful completion of the training. Additional funding is being sought to continue the program and expand it to a total of 15 states.

Achievements:

During its 12 months of operation, RRT greatly exceeded its goal of enrolling 150 participants by enrolling 249, all of whom completed the program and were placed in jobs. Sixty-six businesses participated. More than 4,000 individuals and 100 companies have made inquiries about the program.

Significant attributes:

- Targets IT training and job opportunities to rural residents.
- Awards funds to employers to provide training.
- Focuses training on the needs of specific employers and prospective employees.

Further information:

- Website: www.experienceworks.org
- Charlie Bryson
  Project Manager
  Experience Works, Inc.
  charlie_bryson@experienceworks.org

Latinas en Ciencia

Location/service area: Portland, OR

Sponsors/partners: Oregon Museum of Science and Industry (OMSI)

Funding sources: National Science Foundation

Program description:

The Latinas en Ciencia project goals are: 1) to create ties between OMSI and Portland's Latino community and 2) to educate OMSI staff on strategies to encourage girls to explore science and technology. OMSI does this through education and outreach. It held symposia to help staff learn more about issues surrounding girls and science and technology as well as Latino culture, with emphasis on promoting girls' participation. OMSI also worked with community organizations to develop two science and technology programs for Latinas. It is sponsoring a science club for middle school students and plans to establish an after-school science club, OMSI camp-ins, Super Science Saturdays, and volunteer and mentoring opportunities.

Achievements:

As an outgrowth of these programs, OMSI now holds monthly Latino Family Days at the museum.

Significant attributes:

- Targets girls and Latinos.
- Provides motivation and support to pursue science and technology fields.
- Educates sponsoring organization's staff to increase knowledge and awareness of the Latino population.
- Works in partnership with Latino community organizations.

Further information:

- Website: www.omsi.edu/education/latinas/index.cfm
- 503-239-7810
  veronika.nunez@omsi.edu

The Next Step©98

Location/service area: Kentucky

Sponsors/Partners: Bullitt County Adult & Community Education Program, Bullitt County Public Schools, Kentucky Department of Adult Education & Literacy (DAEL), Kentucky Department of Employment Services

Funding Sources: DAEL; other family literacy programs; Humana, Inc.; Publishers Printing Company; United Parcel Service; U.S. Post Office; various school systems; and many other agencies and organizations through their donations of time and equipment

Program description:

The Next Step©98 program targets students with low literacy levels whose progress typically has been limited by the families or support groups surrounding them. Recognizing that the whole group must be involved for a student to advance, The Next Step©98 engages the entire family unit in the process. Successful from the beginning, this program has created a community of support for its members. The program has several basic elements: 1) It refurbishes used computers donated from industry, 2) places the computers in the homes of families in which no one has a high school diploma or GED or no one functions at the high school level, 3) contracts with all members of a household to establish a goal for each to achieve and to gain agreement that all members will attend school one night a week as a unit, and 4) gives ownership of the computer to the family upon satisfactory completion of the contract.

Achievements:

Family literacy is being addressed for $1,000 per family. More than 30 percent of participants are male, and 25 percent of the participants are earning a GED. This model program has been replicated in eleven counties in Kentucky in FY 2002 and will expand in FY 2003.

Significant attributes:

- Places technology in the homes of low income or struggling families.
- Involves all members of household.
- Has a defined curriculum to follow for ages 2-6, ages 7-15, and adults.
- Builds a community of support.

Further information:

- Website: www.bullitt.k12.ky.us/adulted
- Jim Boswell
  Director, Bullitt County Adult & Community Education Center
  261 N. Buckman St.
  Shepherdsville, KY 40165
  502-543-3769/955-7721 fax: 502-955-1713
  jboswell@alltel.net

One Economy Corporation

Location/service area: Nationwide

Sponsors/partners: One Economy Corporation

Funding sources: Annie E. Casey Foundation, AOL Time Warner, the Avram Miller Family Foundation, California Bank and Trust, Cisco Systems, City of Baltimore, City of Portland (OR), Discovery Communications, eBay Foundation, Fannie Mae Foundation, Flatiron Foundation, Ford Foundation, Hewlett-Packard, JP Morgan Chase, K12, Leonsis Foundation, Markle Foundation, Meyer Memorial Trust, Power Up, Robert Wood Johnson Foundation, Smart Force, Sylvan Learning Systems, US Bank, Washington Mutual, W. K. Kellogg Foundation, Zions Bank

Program description:

One Economy is a Washington, DC-based national nonprofit organization created to help low income people build assets and raise their standard of living through access to technology. One Economy helps provide computers and Internet access in the homes of low income people, develops and aggregates relevant self-help-oriented content through its Website, and demonstrates what works in digital community sites. Twelve Cisco technologists around the country help accelerate the digital access work. The Digital Connectors program in the digital community sites trains youths to provide computer and Internet training and technical support to other residents.

Achievements:

One Economy has launched its Beehive Website and established digital communities in Washington, DC, and Portland, OR. Through the Cisco technologists, it has provided access to countless residents of government-subsidized housing across the country.

Significant attributes:

- Reaches out to low income, predominantly urban population to provide exposure to and training in IT.
- Uses the Internet as a primary method of service delivery.
- Motivates and supports low income people to use technology.
- Forms local partnerships to carry out its digital communities efforts.

Further information:

- Website: www.one-economy.com
- Ben Hecht
  President and COO, One Economy Corporation
  Washington, DC
  202-393-4660

Origin, Inc.

Location/service area: New York, Baltimore, San Francisco, Los Angeles, Chicago, San Antonio, Dallas

Sponsors/partners: Jobs for the Future, local partnerships in target cities

Funding sources: Rockefeller Foundation, Ford Foundation, New York Community Trust, Citigroup Foundation

Program description:

Origin, Inc., is a Boston-based nonprofit organization formed by Jobs for the Future to prepare and place low income adults in higher-paying technology jobs. Origin trains job entrants for IT-related jobs that do not require a college education. Its approach is to work with businesses to identify their employment needs, design a specialized training program, and use training partners to develop the skills of job candidates. Origin also pre-qualifies candidates with the employers so that they will be hired after training completion.

Achievements:

Begun in 2001, Origin, Inc., plans to serve 79 employment sites in 30 cities and place more than 9,000 workers in IT jobs. Currently, it is working with employers in the seven cities listed above.

Significant attributes:

- Uses an innovative business model to address a social issue.
- Targets low income urban workers for IT-related jobs.
- Uses specialized training program to meet employer and employee needs.
- Forms local partnerships with businesses and training providers.

Further information:

- Website: www.jff.org/programs/cluster2/origins.html
- Carmon Cunningham
  VP, Technology & Communications
  Jobs for the Future
  617-428-4446
  ccunningham@jff.org

PASS*IT*ON

Location/service area: Denver, CO; Austin, TX; Fairfax, VA; Mt. Laurel/Newark, NJ

Sponsors/partners: Information Technology Association of America (ITAA); Community Options, Inc. (COI); New Jersey Institute of Technology; Austin Community College; Northern Virginia Community College

Funding sources: Microsoft Corporation, U.S. Department of Labor

Program description:

PASS*IT*ON (Plan for Achieving Self-Support with Information Technology Opportunities Nationwide) provides skill-based training, internship opportunities, and job matching for participants with disabilities to meet the IT worker needs of businesses in the target cities. COI refers qualified students through both public and private rehabilitation agencies to the participating educational institutions for training. Applicants must have high school diplomas or the equivalent and good reasoning skills. Local Business Advisory Councils work with the local colleges to prepare and place participants into specific IT jobs.

Achievements:

Each year, more than 75 people with disabilities receive training in the four locations, and approximately 80 percent of participants are placed in IT jobs. The program is based on a successful model program that has operated in Denver for 17 years.

Significant attributes:

- Targets IT training and job opportunities for people with disabilities.
- Provides job support and matching services.
- Customizes training to the needs of this population.
- Executes program through partnerships among business, service, and educational institutions.

Further information:

- Website: www.itaa.org/workforce/programs/passiton.htm
- Darlene VanEvery
  ITAA Senior Program Manager
  Workforce Development
  703-284-5359

SBC Pacific Bell School Volunteer Program

Location/service area: Los Angeles, CA

Sponsors/partners: SBC Pacific Bell, CWA, Los Angeles Unified School District

Funding sources: SBC Pacific Bell donates classroom supplies and materials for students, provides technical expertise, wires classrooms, and pays for employee time.

Program description:

The program seeks to heighten student achievement, improve self-esteem, and develop the relationship between training and successful participation in society. SBC Pacific Bell employee-volunteers serve as classroom assistants to teach, tutor, and mentor K-12 students, with emphasis on the use of technology. Volunteers work closely with students over a period of time and are able to establish bonds of trust and friendship and to motivate them. Employees receive one hour of paid release time each week and are also paid for their travel time.

Achievements:

Since 1992, some 400 employee-volunteers have contributed 60,000 hours to serve 20,000 students in six participating schools.

Significant attributes:

- Encourages students from underserved populations to use technology.
- Uses a business, labor, and school partnership.
- Grants paid release time to workers participating in the program.
- Emphasizes forming bonds of trust and friendship to motivate students.

Further information:

Charlotte Arrick
Director—Education Outreach, Community Relations
SBC Pacific Bell
1010 Wilshire Blvd
Los Angeles, CA 90017
213-975-7073
charlotte.arrick@sbc.com

Senior Community Service Employment Program (SCSEP)

Location/service area: Nationwide, primarily rural areas

Sponsors/partners: Experience Works, Inc.

Funding sources: U.S. Department of Labor, Employment and Training Administration

Program description:

SCSEP provides training and employment opportunities to low income, older Americans residing primarily in rural areas. A major goal of the program is to enhance the skills of participants to increase their employability for jobs offering improved income and benefits. Participants must be at least 55 years old and meet income guidelines. During the training period, participants work in local nonprofit or public agencies for an average of 20 hours a week, receiving the minimum wage. Many trainees enroll in Experience Works training programs in high demand occupations such as computer technology and health care.

Achievements:

Since 1965, about 500,000 low income older workers have participated in and been helped by the program. SCSEP currently serves approximately 100,000 seniors annually.

Significant attributes:

- Provides seniors with training opportunities to gain or upgrade IT skills.
- Combines training, employment, and community service opportunities.
- Helps change stereotypes in the workplace about aging and older workers.

Further information:

- Website: www.experienceworks.org/scsep.html
- Experience Works, Inc.
  2000 N. 14th St., Suite 800
  Arlington, VA 22201
  800-901-7965

Technology Enhancement Capital Campaign (TECC)

Location/service area: 39 traditionally Black colleges and universities

Sponsors/partners: United Negro College Fund (UNCF)

Funding sources: IBM, Hewlett-Packard, GE Fund, ExxonMobil, Microsoft, Dell, Oracle, AT&T

Program description:

The initial purpose of TECC is to close the IT gap at UNCF-member Black colleges and universities by providing computer hardware, software, computing facilities, wiring, and technical services. The program allows students and faculty to purchase personal computers for as little as $300. TECC's next priority is to expand technology use through training and faculty development.

Achievements:

TECC has provided more than 100,000 software and e-mail packages and on-line learning tools, 2,500 computers, and 5,000 network servers and printers. The goal is to have all 39 colleges and universities wired and on-line by the end of 2002.

Significant attributes:

- Targets IT resources and training for African American students and faculty attending traditionally Black educational institutions.
- Provides motivation and support to African American students and faculty.
- Functions through a business-education partnership.

Further information:

- Website: www.uncf.org
- Kathy Andrews
  United Negro College Fund
  703-205-3591
  Kathy.Andrews@uncf.org

Workforce Development Resources

This resource list provides Websites related to the topics in this and the two earlier DEOC reports.

Digital Economic Opportunity Committee Member Organizations

- AFL-CIO, Department for Professional Employees—www.aflcio.org
- American Federation of Teachers—www.aft.org
- Communications Workers of America—www.cwa-union.org
- International Federation of Professional & Technical Engineers—www.ifpte.org
- National Education Association—www.nea.org
- United Food & Commercial Workers International Union—www.ufcw.org
- Writers Guild of America, East—www.wgaeast.org
- Exxon Mobil Corporation—www.exxonmobil.com
- General Electric Company—www.ge.com
- Lucent Technologies—www.lucent.com
- 3M Corporation—www.mmm.com
- National Alliance of Business—www.nab.com
- Verizon Communications—www.verizon.com
- Graduate School, USDA—www.grad.usda.gov
- Montgomery College (MD)—www.mc.cc.md.us

Education and Training

- American Association of Community Colleges—www.aacc.nche.edu
- American Society for Training and Development (ASTD)—www.astd.org
- Association of Joint Labor/Management Educational Programs—www.workplacelearning.org
- Education Development Center (EDC)—www.edc.org

- EDUCAUSE—www.educause.edu
- George Lucas Educational Foundation—www.glef.org
- International Society for Technology in Education—www.iste.org
- National Association of Manufacturers, Center for Workforce Success—www.nam.org/workforce
- United States Distance Learning Association—www.usdla.org

Skill Standards

- National Skill Standards Board—www.nssb.org
- National Workforce Center for Emerging Technologies—www.nwcet.org

Government

- Federal Mediation & Conciliation Service—www.fmcs.gov
- National Center for Education Statistics—www.nces.ed.gov
- National Institute on Disability & Rehabilitation Research—ed.gov/offices/OSERS/NIDRR/index.html
- National Telecommunications & Information Administration (NTIA)—www.ntia.doc.gov
- U.S. Department of Education, Office of Educational Technology—www.ed.gov/Technology
- U.S. Department of Labor, Employment & Training Administration—www.doleta.gov

Internet and Information Technology

- Digital Divide Network (Benton Foundation)—www.digitaldividenetwork.org
- Digital Promise Project—www.digitalpromise.org
- Information Technology Association of America—www.itaa.org
- Pew Internet and American Life Project—www.pewinternet.org

African Americans

- Black Data Processing Associates (BDPA)—www.bdpa.org
- National Urban League—www.nul.org

Inner City Communities

- Jobs for the Future—www.jff.org
- One Economy Corporation—www.one-economy.com

Latinos

- La Familia Network—www.lafamilianet.net
- Tomas Rivera Policy Institute—www.trpi.org

Native Americans

- National Congress of American Indians—www.ncai.org
- National Indian Telecommunications Institute—www.niti.org

People with Disabilities

- Community Options—www.comop.org
- Rehabilitation Engineering & Assistive Technology Society of North America (RESNA)—www.resna.org

Rural Communities

- Center for the Study of Rural America—www.kc.frb.org/RuralCenter/RuralMain.htm
- Huck Boyd National Institute for Rural Development—www.oznet.ksu.edu/huckboyd

Seniors

- AARP—www.aarp.org
- Experience Works, Inc.—www.experienceworks.org

Women

- Center for Women & Information Technology—www.umbc.edu/cwit
- Gender & Diversities Institute (EDC)—www.edc.org/GDI/gems/gemabout.htm
- Gender Initiative, Cisco Learning Institute—www.gender.ciscolearning.org
- National Council for Research on Women—www.ncrw.org

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Selected NPA Publications

Building a Digital Workforce, Part 2: Reaching Out to Underserved Communities, NPA/Digital Economic Opportunity Committee (56 pp, 2002, $10.00), NPA #304.

Building a Digital Workforce, Part 1: Raising Technological Skills, NPA/Digital Economic Opportunity Committee (48 pp, 2001, $10.00), NPA #303.

Improving the Health of Working Families: Research Connections Between Work and Health, Irene H. Yen and John W. Frank, NPA/Committee on New American Realities, (52 pp, 2002, $15.00), NPA #302.

Income, Socioeconomic Status, and Health: Exploring the Relationships, ed. James A. Auerbach and Barbara Kivimae Krimgold (NPA/Academy for Health Services Research and Health Policy, 176 pp, 2001, $20.00), NPA #299.

Improving Health: It Doesn't Take a Revolution, James A. Auerbach, Barbara Kivimae Krimgold, and Bonnie Lefkowitz (NPA/Academy for Health Services Research and Health Policy, 30 pp, 2000, $10.00), NPA #298.

New Directions: African Americans in a Diversifying Nation, ed. James S. Jackson (308 pp, 2000, $24.95), NPA #297.

Employment Practices and Business Strategy, ed. Peter Cappelli. Commissioned by the Committee on New American Realities (NAR), available from Oxford University Press and from NPA (240 pp, 1999, $29.95).

How Public Education Must Respond to Meet the Challenges of a Global Society, by Donald P. Nielson (24 pp, 1998, $5.00), NPA #292.

Through a Glass Darkly: Building the New Workplace for the 21st Century, ed. James A. Auerbach (148 pp, 1998, $15.00), NPA #289.

The Inequality Paradox: Growth of Income Disparity, ed. James A. Auerbach and Richard S. Belous (276 pp, 1998, $19.95), NPA #288.

When Earnings Diverge: Causes, Consequences, and Cures for the New Inequality in the U.S., by Richard B. Freeman (80 pp, 1997, $12.00), NPA #284.

Change at Work, ed. Peter Cappelli. An NAR Committee-commissioned study available from Oxford University Press (288 pp, 1997, $27.00).

A Synopsis of Change at Work (40 pp, 1997, $8.00), NPA #283.

Aging and Competition: Rebuilding the U.S. Workforce, ed. James A. Auerbach and Joyce C. Welsh, with an Introduction by Robert B. Reich (280 pp, 1994, $17.50), NPA #273.

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